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10/526,011	02/25/2005	Nobuki Matsui	4633-0134PUS1	2824

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EXAMINER	
CHUO, TONY SHENG HSIANG	
ART UNIT	PAPER NUMBER
1795	

NOTIFICATION DATE	DELIVERY MODE
03/13/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary	Application No.	Applicant(s)	
	10/526,011	MATSUI ET AL.	
	Examiner	Art Unit	
	Tony Chuo	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 December 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) *8-14* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 February 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1/6/09*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Claims 1-14 are currently pending. New claims 7-14 have been added. Newly submitted claims 8-14 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: the apparatus as claimed can be used to practice another and materially different process. The fuel cell system can be operated without performing a startup operation in which the source gas and the oxygen containing gas are flowed through the reformer, and the partial oxidation gas is supplied to the fuel electrode because these limitations are construed as intended use and are not given patentable weight in the apparatus claims.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 8-14 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

The previous objections to the specification are withdrawn. The amended claims do not overcome the previously stated 102 and 103 rejections. Therefore, upon further consideration, claims 1-7 are rejected under the following 102 and 103 rejections. In addition, claims 1 and 3-7 are also rejected under the following new 112, 2nd paragraph rejection.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 1/6/09 was filed after the mailing date of the non-final rejection on 8/29/08. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1 and 3-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 is indefinite because it is unclear what temperature is "below a minimum operating temperature" since the minimum operating temperature of the fuel cell is unknown.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects

for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1, 4, 6, and 7 are rejected under 35 U.S.C. 102(e) as being anticipated by Haltiner, JR et al (US 2003/0235733).

Regarding claims 1 and 7, the Haltiner reference discloses a fuel cell system comprising: a reformer "106" through which an oxygen-containing gas "74" and a vaporized fuel (source gas) are flowed and which has a reformer catalyst "104" for causing the partial oxidation of hydrocarbons contained in the vaporized fuel; and a solid electrolyte fuel cell "44" & "46" that is disposed downstream of the reformer and which has a cell main unit which includes: an anode "16" which is supplied with a partial oxidation gas, a cathode "18" that is supplied with oxygen-containing gas, and an electrolyte "14" between the anode and cathode, wherein an electrode reaction of the partial oxidation gas and the oxygen-containing gas inherently is caused to take place in the anode, cathode, and electrolyte (See paragraphs [0002],[0031],[0039] and Figure 2). In addition, it also discloses a fuel cell system that is operated at a temperature of 700-800°C (See paragraph [0006]). Examiner's note: It is contended by the examiner that the Haltiner fuel cell stack is at least capable of operating at a temperature below a minimum operating temperature of approximately 700°C.

Regarding claim 4, it also discloses a start-up combustor "77" for burning the vaporized fuel and anode air feed "74" during the startup phase of the reformer and combustion gas supply means (not labeled) for supplying to the reformer "106" a combustion gas generated as a result of burning of the vaporized fuel and the anode air

feed "74" in the start-up combustor so that the reformer is heated (See paragraph [0037]).

Examiner's note: Claim 4 appears to be invoking 35 USC 112, 6th paragraph. The start-up combustor taught by Haltiner is construed as an equivalent structure for burning the source gas and the oxygen containing gas during the startup phase of the reformer. The line connecting the start-up combustor and the reformer is construed as an equivalent structure for supplying to the reformer a combustion gas generated as a result of the burning of the source gas and the oxygen-containing gas in the start-up combustor.

Regarding claim 6, it also discloses an afterburner "66" (third combustion means), a heat exchanger "92", and a cathode air feed "75" (oxygen containing gas supply means) (See paragraph [0037],[0038],[0039] and Figure 2).

Examiner's note: Claim 6 appears to be invoking 35 USC 112, 6th paragraph. The afterburner "66" taught by Haltiner is construed as an equivalent structure for burning a source gas "110" and a first oxygen containing gas "64". The heat exchanger "92" is construed as an equivalent structure for performing heat exchange between a combustion gas "112" and a second oxygen containing gas "75" different from the first oxygen containing gas. The cathode air feed line "75" is construed as an equivalent structure for supplying to the cathode a second oxygen containing gas heated by the heat exchanger.

7. Claims 1, 3, and 6 are rejected under 35 U.S.C. 102(e) as being anticipated by Xu (US 6551732).

Regarding claim 1, the Xu reference discloses a fuel cell system comprising: a reformer "6" through which an oxygen-containing gas "108" and a source gas "202" are flowed and which has a catalyst for causing the partial oxidation of hydrocarbons contained in the source gas; and a solid polymer electrolyte fuel cell "3" that is disposed downstream of the reformer and which has a cell main unit which includes: an anode "22" which is supplied with a partial oxidation gas, a cathode "20" that is supplied with oxygen-containing gas, and an electrolyte between the anode and cathode, wherein an electrode reaction of the partial oxidation gas and the oxygen-containing gas inherently is caused to take place in the anode, cathode, and electrolyte (See column 5, line 28-60 and Figure 1). Examiner's note: It is contended by the examiner that the Xu fuel cell stack is at least capable of operating at a temperature below a minimum operating temperature.

Regarding claim 3, it also discloses a heat exchanger "5" (See Figure 1).

Examiner's note: Claim 3 appears to be invoking 35 USC 112, 6th paragraph. The heat exchanger "5" taught by Xu is construed as an equivalent structure for performing heat exchange between the source gas "202" and the oxygen-containing gas "108" prior to their entry into the reformer "6".

Regarding claim 6, it also discloses an combustor "12" (third combustion means), a heat exchanger "4", and a cathode air feed "75" (oxygen containing gas supply means) (See paragraph [0037],[0038],[0039] and Figure 2).

Examiner's note: Claim 6 appears to be invoking 35 USC 112, 6th paragraph. The combustor "12" taught by Xu is construed as an equivalent structure for burning a

source gas "308" and a first oxygen containing gas "120". The heat exchanger "4" is construed as an equivalent structure for performing heat exchange between a combustion gas "312" and a second oxygen containing gas "106" different from the first oxygen containing gas. The stream "108" is construed as an equivalent structure for supplying to the reformer "6" a second oxygen containing gas heated by the heat exchanger.

8. Claims 1 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by Matsui et al (JP 2001-155747).

Regarding claim 1, the Matsui reference discloses a fuel cell system comprising: a reformer "5" through which an oxygen-containing gas "29" and a source gas "14" are flowed and which has a catalyst for causing the partial oxidation of hydrocarbons contained in the source gas; and a solid polymer electrolyte fuel cell "1" that is disposed downstream of the reformer and which has a cell main unit which includes: an anode "3" which is supplied with a partial oxidation gas, a cathode "2" that is supplied with oxygen-containing gas, and an electrolyte between the anode and cathode, wherein an electrode reaction of the partial oxidation gas and the oxygen-containing gas inherently is caused to take place in the anode, cathode, and electrolyte (See paragraphs [0037],[0042],[0043] and Drawing 1). Examiner's note: It is contended by the examiner that the Matsui fuel cell stack is at least capable of operating at a temperature below a minimum operating temperature.

Regarding claim 3, it is inherent that when the source gas mixes with the oxygen-containing gas in the line prior to their entry into the reformer, heat exchange would occur between the source gas and the oxygen-containing gas.

Examiner's note: Claim 3 appears to be invoking 35 USC 112, 6th paragraph. The line prior to the reformer taught by Matsui is construed as an equivalent structure for performing heat exchange between the source gas and the oxygen-containing gas prior to their entry into the reformer.

9. Claims 1 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by Kamiya (JP 2002-025588).

Regarding claim 1, the Kamiya reference discloses a fuel cell system comprising: a reformer "3" through which an oxygen-containing gas "26" and a source gas "22" are flowed and which has a catalyst for causing the partial oxidation of hydrocarbons contained in the source gas; and a solid polymer electrolyte fuel cell "G" that is disposed downstream of the reformer and which has a cell main unit which includes: an anode which is supplied with a partial oxidation gas, a cathode that is supplied with oxygen-containing gas, and an electrolyte between the anode and cathode, wherein an electrode reaction of the partial oxidation gas and the oxygen-containing gas inherently is caused to take place in the anode, cathode, and electrolyte (See paragraphs [0012],[0014],[0015] and Drawing 1). Examiner's note: It is contended by the examiner that the Kamiya fuel cell stack is at least capable of operating at a temperature below a minimum operating temperature.

Regarding claim 3, it is inherent that when the source gas "22" mixes with the oxygen-containing gas "26" in the line prior to their entry into the reformer, heat exchange would occur between the source gas and the oxygen-containing gas.

Examiner's note: Claim 3 appears to be invoking 35 USC 112, 6th paragraph. The line prior to the reformer taught by Kamiya is construed as an equivalent structure for performing heat exchange between the source gas and the oxygen-containing gas prior to their entry into the reformer.

10. Claim 2 is rejected under 35 U.S.C. 102(b) as being anticipated by Foger et al (WO 01/13452).

The Foger reference discloses a fuel cell system comprising: a pre-reformer "10" having a catalytic part which when a source gas is flowed therethrough converts hydrocarbons contained in the source gas having a carbon number equal to or greater than 2 into methane in the presence of hydrogen and which when steam (oxygen-containing gas) and the source gas are flowed therethrough, causes the partial oxidation of hydrocarbon contained in the source gas and; and a solid oxide fuel cell "14" that is disposed downstream of the reformer and which has a cell main unit which includes: an anode which is supplied with a hydrogen containing gas, a cathode that is supplied with oxygen-containing gas, and an electrolyte between the anode and cathode, wherein an electrode reaction of the hydrogen containing gas and the oxygen-containing gas inherently is caused to take place in the anode, cathode, and electrolyte (See page 4, line 8 to page 5, line 14 and Fig. 1).

Examiner's note: the startup operation and the normal operation limitations are not given patentable weight because they are construed as being intended use. Since the Foger fuel cell structure is capable of performing the intended use, it reads on the claim.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsui et al (JP 2001-155747) in view of Ogawa et al (JP 59-098471). The Matsui reference is applied to claim 1 for reasons stated above.

However, Matsui et al does not expressly teach a second combustion means for burning the source gas and the oxygen-containing gas, and a second combustion gas supply means for supplying to the oxygen electrode a combustion gas generated as a result of the burning of the source gas and the oxygen-containing gas in the second combustion means. The Ogawa reference teaches a combustor "25" for burning a fuel gas and oxidizer gas and a line "29" for supplying to the oxygen electrode a combustion gas generated as a result of the burning of the fuel gas and the oxidizer gas in the combustor "25" so that the oxygen electrode is heated (See Abstract). Examiner's note: Claim 5 appears to be invoking 35 USC 112, 6th paragraph. The combustor "25" taught

by Ogawa is construed as an equivalent structure for burning the source gas and the oxygen containing gas. The line "29" is construed as an equivalent structure for supplying to the oxygen electrode a combustion gas generated as a result of the burning of the source gas and the oxygen-containing gas in the combustor.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Matsui fuel cell system to include a second combustion means for burning the source gas and the oxygen-containing gas, and a second combustion gas supply means for supplying to the oxygen electrode a combustion gas generated as a result of the burning of the source gas and the oxygen-containing gas in the second combustion means in order to make the temperature of every layer in the fuel cell body rise up more uniformly at the start up of the fuel cell (See Abstract).

13. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsui et al (JP 2001-155747) in view of Sakamoto et al (JP 11-067256). The Matsui reference is applied to claim 1 for reasons stated above.

However, Matsui et al does not expressly teach a third combustion means for burning the source gas and the oxygen-containing gas, a second heat exchange means for performing heat exchange between a combustion gas generated as a result of burning of the source gas and the first oxygen containing gas in the third combustion means and a second oxygen containing gas different from the first oxygen containing gas, and a oxygen containing gas supply means for supplying to either or both the reformer and the oxygen electrode a second oxygen containing gas heated by the

second heat exchange means. The Sakamoto reference teaches a combustor "302", a heat exchanger "303", and a line "310" for supplying to the reformer "112" a second oxygen containing gas heated by the heat exchanger (See paragraph [0034] and Drawing 1). Examiner's note: Claim 6 appears to be invoking 35 USC 112, 6th paragraph. The combustor "302" taught by Sakamoto is construed as an equivalent structure for burning the source gas and the oxygen containing gas. The heat exchanger "303" is construed as an equivalent structure for performing heat exchange between a combustion gas and a second oxygen containing gas. The line "310" is construed as an equivalent structure for supplying to the reformer a second oxygen containing gas heated by the heat exchanger.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Matsui fuel cell system to include a third combustion means for burning the source gas and the oxygen-containing gas, a second heat exchange means for performing heat exchange between a combustion gas generated as a result of burning of the source gas and the first oxygen containing gas in the third combustion means and a second oxygen containing gas different from the first oxygen containing gas, and a oxygen containing gas supply means for supplying to either or both the reformer and oxygen electrode a second oxygen containing gas heated by the second heat exchange means in order to more easily conduct the temperature keeping or temperature rising of a catalyst reaction unit of a reformer in a fuel cell system (See Abstract).

Response to Arguments

14. Applicant's arguments filed 12/29/08 have been fully considered but they are not persuasive.

The applicant argues that Haltiner, Xu, Matsui, and Kamiya each neither discloses or suggests "an electrode reaction of said partial oxidation gas and said oxygen-containing gas is caused to take place in said fuel electrode, said oxygen electrode and said electrolyte, and said fuel cell having a temperature that is below a minimum operating temperature" as recited in amended independent claim 1. In response, the examiner contends that it is well known in the art that during normal operating condition of a fuel cell, an electrode reaction of a partial oxidation gas takes place at the fuel electrode (anode) and an electrode reaction of an oxygen containing gas takes place in the oxygen electrode (cathode). Therefore, the examiner maintains the contention that Haltiner, Xu, Matsui, and Kamiya, each either implicitly or explicitly discloses "an electrode reaction of said partial oxidation gas and said oxygen-containing gas is caused to take place in said fuel electrode, said oxygen electrode and said electrolyte". In addition, the recitation "said fuel cell having a temperature that is below a minimum operating temperature" is not given patentable weight because a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. The examiner contends that fuel cells have a temperature that is below a minimum operating temperature such as during start-up.

Regarding the Foger reference, the applicant argues that contrary to the assertion by the Examiner, the cited portion merely describes reacting hydrocarbon fuel with steam in a pre-reformer to produce a fuel stream including hydrogen and methane. The fuel stream is then sent to a high temperature fuel cell to react with an oxidant. Nowhere in Foger is there a disclosure or suggestion of a reformer causing a partial oxidation of hydrocarbons contained in a source gas when an oxygen-containing gas and the source gas are flowed therethrough as in the present invention. For further clarification, the Foger reference discloses "methane is formed by steam reforming of the higher hydrocarbons to form carbon monoxide, carbon dioxide and hydrogen followed by further reaction to methane" (See page 5, lines 8-14). This steam reforming is equivalent to partial oxidation of higher hydrocarbons in a source gas when an oxygen-containing gas and the source gas are flowed therethrough. It is inherent that steam is an oxygen-containing gas because oxygen is necessary in the steam reforming process.

The applicant further argues that contrary to the assertion by the Examiner, the fuel cell in Foger is incapable of performing "a startup operation in which said source gas and said oxygen-containing gas are flowed through said catalytic part of said reformer, and a partial oxidation gas which contains hydrogen generated as a result of the flowing of said source gas and said oxygen- containing gas through said reformer is supplied to said fuel electrode as said hydrogen- containing gas, and a normal operation in which said source gas is flowed through said catalytic part of said reformer and a fuel gas which contains methane generated as a result of the flowing of said

source gas through said reformer is supplied to said fuel electrode" as recited in independent claim 2. In response, this argument appear to a statement of the attorney's opinion and not based upon any factual evidence. Therefore, the examiner maintains the contention that the Foger fuel cell system is capable of performing the startup and normal operations recited in claim 2.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571)272-0717. The examiner can normally be reached on M-F, 9:00AM to 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for

the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TC

/Jonathan Crepeau/
Primary Examiner, Art Unit 1795